

CLAIMS

1. A discharge device for a rod-like product one end of which is larger sized, comprising: a hopper (10) not only swaying, but also having an opening portion (11), at the bottom surface thereof, extending in a direction of a rotation center axis of a swaying motion; a driving mechanism (20) swaying the hopper (10); and a bottom cover (30) closing the opening portion (11) of the swaying hopper (10) so that rod-like products (W) does not escape therefrom, wherein
the bottom cover (30) has the upper surface closing the opening portion (11) of the hopper (10) profiled so that the rod-like products (W) do not escape from the opening portion (11) of the swaying hopper (10) and a slit (31) extends in a direction perpendicular to a direction of the swaying motion so as to be open on the upper surface, the slit (31) having a width that does not allow the maximum outer size portion of a rod-like product (W) to pass therethrough, but lets almost all the rod-like product to pass therethrough, and
the driving mechanism (20) sways the hopper (10) so that the opening portion (11) of the hopper (10) move along the upper surface of the bottom cover (30) to thereby guide rod-like products (W) accommodated in the hopper (10) into the slit (31) of the bottom cover (30) and to discharge the rod-like products (W) from the slit (31) being arranged in order therein.
2. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the bottom cover (30) is vibrated to discharge the rod-like products (W) gulded into the slit (31).
3. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the upper surface of the bottom cover (30) takes a profile in conformity with an circular arc so that rod-like products (W) do not escape from the opening portion (11) of the swaying hopper (10).
4. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the hopper (10) has a flat bottom plate (13).

5. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the hopper (10) has a bottom plate (13) inclined toward the opening portion (11).
- 5 6. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the hopper (10) has a width of the opening portion (11) narrower than that of whole the hopper (10).
7. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the maximum inclination angle of the hopper (10) is in the range of from 5 to 60 degrees.
- 10 8. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein the sway cycle of the hopper (10) is in the range of 0.5 to 10 sec.
- 15 9. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein in the hopper (10), rubber-like elastic bodies (14) are fixed at the opening portion (11) of the hopper (10) so as to be close to the bottom cover (30).
- 20 10. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein in the hopper (10), rubber-like elastic bodies (14) are fixed at the opening portion (11) of the hopper (10) and the rubber-like elastic bodies (14) is defined to have a width in which the end edges thereof get close to the slit (31) when the hopper (10) is inclined.
- 25 11. The discharge device for a rod-like product one end of which is larger sized according to claim 1, wherein inclination plates (15) are connected to the opening portion (11) of the hopper (10) so that the end edges of the inclination plates (15) are close to the bottom cover (30).
- 30 12. The discharge device for a rod-like product one end of which is larger

sized according to claim 1, wherein in the hopper (10), inclination plates (15) are fixed to the opening portion (11) and elastic bodies (16) are connected to the inclination plates (15) so that the end edges of the inclination plates (15) get close to the bottom cover (30) using the elastic bodies (16).

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13. The discharge device for a rod-like product one end of which is larger sized according to claim 1, comprising: a removal arm (50) catching and pulling off a pipet tip, by the flange thereof, moved in a piled-up state, wherein rod-like products (W) are pipet tips.

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14. The discharge device for a rod-like product one end of which is larger sized according to claim 13, comprising not only the removal arm (50), so as to be inclined relative to a fixing portion (35) not swaying together with the hopper (10), but also an inclination mechanism (52) for inclining the removal arm (50) constituted of permanent magnets (53) fixed on the hopper (10) and the removal arm (50) at respective opposite portions thereof.

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15. The discharge device for a rod-like product one end of which is larger sized according to claim 13 or 14, wherein the bottom cover (30) is defined to form an upward inclined slit (32) catching the flange of an pipet tip piled up on a pipet tip to be moved in the slit (31) and raising the piled up pipet tip, wherein the upward inclined slit (32) is not only inclined at an upward gradient in a moving direction of the pipet tips, but the fore end of the removal arm (50) is also provided to the upward inclined slit (32), thereby removing the piled-up pipet tip moved along the upward inclined slit (32).

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16. The discharge device for a rod-like product one end of which is larger sized according to claim 15, wherein the upward inclined slit (32) is defined to form a clearance (33) through which the flange (T) of a rod-like product (W) at the lowest level passes between the fore end of the upward inclined slit (32) and the bottom cover (30), the clearance (33) being narrower than twice a thickness of the flange (T) of a rod-like product (W).

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